IN THE CLAIMS

1. (Currently Amended) A method of processing a block of information, the method comprising:

forming separately at least two error control coded streams from the block of information, the formed at least two error control coded streams being transmitted in response to a confirmation message, wherein a first error control coded stream of the at least two error control coded streams is independently transmitted by a first antenna of a multiple antenna system and a second error control coded stream of the at least two error control coded streams is independently transmitted by a second antenna of the multiple antenna system.

2. (Cancel)

3. (Currently Amended) The method of Claim 1, wherein the at least two error control coded streams comprise at least one of a Chase packet and/or at least one of an Incremental Redundancy subpacket.

4. (Previously Presented) The method of Claim 3, wherein the confirmation message comprises an acknowledgement message or a non-acknowledgement message.

5. (Original) The method of Claim 4, further comprising:

re-transmitting the Chase packet in response to the non-acknowledgement message.

6. (Original) The method of Claim 5, wherein the step of retransmitting the Chase

packet is repeated until at least one of the acknowledgement message is received, a time out occurs, and one less than a maximum number of symbol periods is reached.

7. (Original) The method of Claim 4, further comprising:

transmitting at least another Incremental Redundancy sub-packet in response to the non-acknowledgement message.

8. (Original) The method of Claim 7, wherein the step of transmitting at least another Incremental Redundancy sub-packet is repeated until at least one of the acknowledgement message is received, a time-out occurs, and one less than a maximum number of symbol periods is reached.

9. (Currently Amended) The method of Claim 1, wherein the at least two error control coded streams are employed in at least one of a one-to-many communication system and a many-to-many communication system.

10. (Currently Amended) A method of processing received error control coded streams that are formed separately, the method comprising:

performing independent error detection of at least two of the received error control coded streams in a multiple antenna system, wherein at least one confirmation message is transmitted in response to the performed independent error detection.

11. (Currently Amended) The method of Claim 10, further comprising:

forming a block of information from the independent error detected at least two received error control coded streams.

12. (Currently Amended) The method of Claim 11, wherein each of the at least two received error control coded signals are independently received by [[at least one]] a single antenna of [[a]] the multiple antenna system.

13. (Currently Amended) The method of Claim 11, wherein the step of performing independent error detection comprises cyclic redundancy checking the at least two error control coded streams.

14. (Currently Amended) The method of Claim 13, wherein the at least two error control coded streams comprise at least one of a Chase packet and/or at least one of an Incremental Redundancy subpacket.

15. (Currently Amended) The method of Claim 14, wherein the at least one confirmation message comprises at least one of an acknowledgement message and a non-acknowledgement message, and the acknowledgement message is transmitted if at least one of a combined Chase packet or at least one of a combined Incremental Redundancy subpacket of the at least two received error control coded streams passes the step of cyclic redundancy checking.

16. (Currently Amended) The method of Claim 15, further comprising:

transmitting at least another confirmation message in response to performing cyclic

redundancy checking on at least one combined packet including the at least one Chase packet and/or performing cyclic redundancy checking on at least one combined packet including another at least one Incremental Redundancy sub-packet from the at least two received error control coded streams.

17. (Currently Amended) The method of Claim 14, wherein the at least one confirmation message comprises at least one of an acknowledgement message and a non-acknowledgement message, the non-acknowledgement message is transmitted if at least one of a combined Chase packet or at least one of a combined Incremental Redundancy sub-packet of the at least two received error control coded streams fails the step of cyclic redundancy checking.

18. (Currently Amended) The method of Claim 17, [[an Incremental Redundancy function to be performed]] further comprising performing an Incremental Redundancy function on at least one of the at least two received error control coded streams for packet combining, wherein the Incremental Redundancy function causes cyclic redundancy checking of the failure of the Incremental Redundancy sub-packet.

19. (Currently Amended) The method of Claim 18, further comprising:

transmitting at least another confirmation message in response to performing cyclic redundancy checking on at least one combined packet including the at least one Chase packet and/or performing cyclic redundancy checking an at least one combined packet including another at least one Incremental Redundancy sub-packet from the at least two received error control coded streams.

20. (Currently Amended) The method of Claim 19, [[wherein a Chase function to be performed]] further comprising performing a Chase function on at least one of the at least two received error control coded streams for packet combining, wherein the Chase function causes cyclic redundancy checking of the failure of the Chase packet.

21. (Currently Amended) The method of Claim 19, further comprising:

transmitting at least another confirmation message in response to performing cyclic redundancy checking on at least one combined packet including at least one Chase packet and/or performing cyclic redundancy checking an at least one combined packet including another at least one Incremental Redundancy sub-packet from the at least two received error control coded streams.

IN THE DRAWINGS

The objections to Figures 1 and 2 by the Examiner are noted. Both the Figures 1 and 2 were amended without adding any new subject matter. Reconsideration is respectfully requested.

Specifically, in Figure 1, steps 50 and 60 have been deleted and an exit to routine from block 40 is provided. In addition, step 70 is amended pursuant to the Examiner's suggestion. With respect to Figure 2, steps 160 and 170 have been changed so that the HARQ decoding subprocess appears before the CRC decoding subprocess. An exit from the routine is provided from block 140. As to the packet combining for Chase and/or IP decoding, it is noted that steps 160 and 170 depict this feature as addressed in the Applicants' specification in paragraph 2 on page 12. In this manner, the Examiner is respectfully requested to reconsider the amended drawings.

REMARKS

Claims 1, 3-21 remain pending in the present application. By this amendment, claim 2 is cancelled without prejudice and claims 1, 3 and 9-21 are amended without adding any new subject matter. As amended, independent claim 1 now essentially incorporates limitation of dependent claim 2. In the Office Action, claims 18-21 stand rejected under 35 U.S.C. § 112, second paragraph. The Examiner's rejections of theses claims are respectfully traversed. Accordingly, the Examiner is respectfully requested to reconsider the § 112 rejections of the claims 18-21.

Claims 1-9 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0072285 to ***Onggosanusi*** et al. (hereinafter "***Onggosanusi***"). The Applicants respectfully disagree. As amended, claim 1 calls for a method of processing a block of information including forming separately at least two error control coded streams from the block of information, wherein a first error control coded stream of the at least two error control coded streams is independently transmitted by a first antenna of a multiple antenna system and a second error control coded stream of the at least two error control coded streams is independently transmitted by a second antenna of the multiple antenna system. Support for this limitation may be found on lines 20-23 on page 6 of Applicants' specification. These two separately formed error control coded streams are independently transmitted in response to a confirmation message. As defined in Applicants' specification, for example, using the method of claim 1, the two or more bit streams separately undergo channel encoding and modulation and are formatted in a Chase packet or an IR sub-packet, depending on the HARQ protocol

employed. Then they undergo a MIMO encoding step for each stream to be independently transmitted and/or received by a single antenna of a multiple antenna system.

The ***Onggosanusi*** reference discloses a hybrid HARQ technique based on a basis hopping concept in which P sub-streams are demodulated, merged into a single stream, and decoded to construct frame m. However, ***Onggosanusi*** is silent with regard to separately forming at least two error control coded streams from the processed block of information and independently transmitting each of the at least two error control coded streams by a single corresponding antenna of a multiple antenna system. Instead of forming separately at least two error control coded streams for independent transmission from a block of information, ***Onggosanusi*** describes a method in which data in a frame is first encoded, interleaved, modulated and then split into P sub-streams. *See*, the paragraph [0014] on page 1 in the ***Onggosanusi*** reference. A sub-stream by definition is an integral part of a whole or a main stream. The sub-stream may have a certain length from a starting position to an arbitrary ending position within the whole or main stream. Therefore, ***Onggosanusi*** teaches away from separately forming an error control coded stream, let alone separately forming at least two error control coded streams from the processed block of information for independent transmission thereof by a respective antenna of a multiple antenna system.

The Examiner asserts that the spreading units (108) form transmission streams separately, and the transmission streams so formed are "error coded" streams. In the ***Onggosanusi*** reference, the data in a particular frame, m, is encoded, interleaved, modulated, and split into P sub-streams. A PxP linear transformation is applied by linear transformation block 106 before spreading by spreader 108. See the paragraph [0014]. These P sub-streams are demodulated,

merged into a single stream, and decoded to construct frame m, so there does not appear to be any separate formation of error control coded streams from the same block of information, as claimed in amended claim 1. After demodulation and merging, a Cyclic Redundancy Check (CRC) is performed to determine whether frame m is in error. See the paragraph [0015] in the ***Onggosanusi*** reference. When a packet is declared in error, choosing a different basis will likely reduce the error probability upon retransmission. See the paragraph [0016] in the ***Onggosanusi*** reference. This ***Onggosanusi's*** reliance on a single error coded stream of bits in multiple antenna systems, as such, limits the throughput increases using the HARQ retransmitting technique. That is, the ***Onggosanusi*** reference does not teach or suggest a HARQ technique where a processed block of information may be simultaneously encoded into multiple error control coded streams that may be transmitted independently by an individual antenna.

Instead, for example, Figure 3 in the Applicants' specification shows an aggregate HARQ operation with MIMO with independent coding, modulation, and data rate for each transmit stream. In Figure 4, for example, per transmit stream HARQ operation for use with MIMO with independent coding, modulation and data rate for each transmit stream is shown. Thus, if any one of the streams is decoded correctly, then it need not be re-transmitted. Thus, all of the claim 1 limitations cannot be anticipated by the ***Onggosanusi*** reference. Accordingly, the Examiner is respectfully requested to reconsider § 102 rejection of claim 1 and claims depending therefrom since the amended independent claim 1 is in condition for allowance.

Claims 1-4 and 7-9 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,657,325 to ***Lou*** et al. (hereinafter "***Lou***"). These rejections are respectfully traversed. The ***Lou*** reference takes an information packet from data source 10 and sends it to an

error detection coder 20, which encodes the information packet with an error detection code. See col. 6, ll. 28-50. The Examiner suggests that since ***Lou*** teaches use of the M multipliers 70, separate forming of at least two error control coded streams from a processed block of information is taught or suggested. Instead, the M multipliers 70 apply the sets of M fixed phase offsets to the punctured bits and the punctured packet, so that M copies of the punctured packet are transmitted simultaneously with own set of M fixed phase offsets being selected to provide separate channels having substantially independent fading characteristics. In this way, a fixed phase offset of a set of phase offsets is used to transmit the modulated information packets from the ith antenna; i=1 to M. Therefore, ***Lou*** is silent as to separate coding, modulation, and providing of data rate for each independent transmit stream in an aggregate HARQ operation with MIMO, as shown in Figure 3 of Applicants' specification. Accordingly, the ***Lou*** reference fails to anticipate all the limitations of claim 1 and other rejected claims. Thus, the section 102 rejections of claims 1, 3, 4 and 7-9 should be withdrawn.

Claims 1, 3-11, and 13-21 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,101, 168 to ***Chen*** et al. (hereinafter "***Chen***"). Applicants respectfully traverse the Examiner's rejections. The ***Chen*** reference is directed to a method and apparatus for decoding a data packet using a plurality of channels to allow correction of the data packets received in error. The data is partitioned into data packets which are transmitted within one frame time period. As part of the decoding process, the destination device performs the CRC check of the data packet to determine whether the packet was received in error. If the packet was received in error, the destination device transmits a NACK message to the source device. See col. 2, l. 66 – col. 3, l. 4. The packet received in error can be retransmitted concurrently with the

new packet in the current frame or at a subsequent frame. Preferably, the packet received in error is retransmitted in the current frame to minimize processing delays. See col. 9, l. 48-52.

The Examiner suggests that since ***Chen*** teaches the multipliers 432a, 432d, 432c, 432d, the summer 434a which subtracts the output of multiplier 432c from the output of multiplier 432a to provide the I channel data and the summer 434b which sums the two signals form the output of multipliers 432b and 432d to provide the Q channel data, ***Chen*** describes separately or independently forming the error control coded streams, as disclosed in the Applicant's specification. However, ***Chen*** within the encoder 122, CRC encoder 312 block encodes the data with a CRC polynomial. The CRC encoder 312 appends the CRC bits and inserts a set of code tail bits to the data packet. See col. 4, l. 65 – col. 5, l. 2. Either one encoder 122 is utilized for each traffic channel, or alternatively, one encoder 122 can be utilized for all traffic channels, with the output of encoder 122 demultiplexed into multiple data streams, one data stream for each traffic channel. See col. 5, l. 66 – col. 6, l. 2. Accordingly, the ***Chen*** reference is silent with respect to forming separately at least two error control coded streams from a processed block of information, wherein each of the at least two error control coded streams is independently transmitted by an individual antenna of a multiple antenna system, so the ***Chen*** reference fails to anticipate all the claim 1 limitations. For at least this reason alone, the Examiner is respectfully requested to reconsider the rejection of claims 1, 3-11, and 13-21 over the ***Chen*** reference.

Claims 1, 3, 4, 7, 8 and 11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,983,384 to ***Ross***. Applicants respectfully disagree. The ***Ross*** reference describes a method for turbo-coding in a communications system. Using the turbo-coding

scheme with staged information transmission, an information sequence is encoded twice, *i.e.*, the second encoding being performed after a random interleaving of the information sequence to avoid retransmission of a full packet upon occurrence of a packet error. The Examiner states that the ***Ross*** reference discloses separately forming two "error coded streams" respectively at the outputs of encoder-1(14) and encoder-2 (16) in a HARQ system based on "incremental redundancy."

In FIG. 1, for example, a turbo encoder 12 encodes source information using a parallel concatenation of two convolutional codes in encoder 14 and in encoder 16, typically referred to in the art as Encoder 1 and Encoder 2, respectively. The second encoder, encoder 16, performs the second encoding after random interleaving in an interleaver 18. Rather than the separately formed at least two error control coded streams being independently transmitted by a corresponding antenna in response to a confirmation message, a less than full L-bit packet to be retransmitted as the data samples corresponding to some or all of the stored, punctured code bits P1 and P2, via a channel, upon occurrence of a packet error. See col. 2, ll. 3-43. Accordingly, the ***Ross*** reference is silent with respect to forming of separately at least two error control coded streams from a processed block of information, wherein each of the at least two error control coded streams is independently transmitted by one antenna of a multiple antenna system. Thus, the ***Ross*** reference fails to anticipate all the claim 1 limitations. For at least this reason alone, the Examiner is respectfully requested to reconsider the section 102 rejection of claims 1, 3, 4, 7, 8 and 11 by the ***Ross*** reference.

With respect to the § 103 rejection of claim 12 in the Office Action dated June 02, 2004, Applicants note and believe that the official notice taken by the Examiner as to multiple

receiving antennas has been traversed at least for the reasons set forth in the response to the Office Action dated June 02, 2004. Regardless, Applicants submit that for each instance where the official notice was taken, the Examiner is respectfully requested to cite a specific teaching, suggestion or motivation in a reference(s) to modify the reference(s) or combine reference(s) teachings to obtain the invention in claim 12. Therefore, it is respectfully submitted that the Examiner reconsider the § 103 rejection of claim 12. The Examiner is respectfully requested to reconsider all the pending claims.

In view of these amendments and remarks, the application is now in condition for allowance and the Examiner's prompt action in accordance therewith is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is respectfully requested to call the undersigned at the Houston, Texas telephone number (713) 934-4050 to discuss the steps necessary for placing the application in condition for allowance.

Date: 4/26/05

Respectfully submitted,

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